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ASSESSMENT OF STUDENTS' KNOWLEDGE OF THE COVID-19 EPIDEMIC

Abstract: *COVID-19 disease has been a major epidemiological issue ever since its outbreak across the world. An adequate level of knowledge, especially of those members of the public who are professionally exposed to COVID-19 infections remains a priority. This paper aimed to establish students' level of knowledge about the COVID-19 pandemic and to analyse the results according to the field of study and socio-demographic situation. The study involved 146 nursing and cosmetology students of the Collegium Medicum UJK. The survey method was used, and the survey technique was applied. As a research tool, a self-study survey of 34 questions was used. Most respondents were people living in rural areas, people with good financial status and nursing students. Respondents demonstrated good knowledge of the aetiology, characteristics, course, symptoms, diagnosis, and treatment of the disease as well as methods of preventing the COVID-19 pandemic. There was a low level of knowledge regarding the average time of incubation of the virus as well as the use of antibiotics in the treatment of COVID-19. Knowledge of the COVID-19 triggering factor was indeed related to gender and marital status. The economic status, age and field of study significantly affect the knowledge of the*

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length of time that the airborne virus maintains the ability to infect. There is also a relationship between economic status and knowledge of the route of transmission. The main findings of the research are the following: 1) Students demonstrate the knowledge of the disease characteristics, aetiology, course, and symptoms as well as diagnostic methods, and treatments for COVID-19, 2) students demonstrated a good level of knowledge of the principles of prevention and the spread of the COVID-19 pandemic, 3) significant relationship between socio-demographic factors and the level of knowledge of the COVID-19 pandemic has not been confirmed, 4) the field of study does not significantly affect the level of knowledge.

Keywords: assessment of students' knowledge, COVID-19 epidemic

Introduction

At the end of 2019, coronavirus disease known as COVID-19 emerged in the world⁵. The name of the new disease was proposed and announced by the World Health Organization (WHO) on February 11, 2020⁶. This novel disease was defined as a dangerous infectious illness affecting the respiratory system⁷. The disease is caused by an unknown virus-coronavirus of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)⁸. The name of the virus leading to COVID-19 was proposed and approved by the Coronavirus Study Group of the International Committee on Taxonomy of Viruses⁹. In 2020, because of high morbidity and high death rates caused by COVID across the whole world from March 11, 2020, WHO declared an international pandemic¹⁰.

⁵ Z. Drulis-Kawa, *Koronawirus SARS-CoV-2 – biologia, wykrywanie i zwalczanie*, „Uniwersytet Wrocławski Przegląd Uniwersytecki” 2020, Vol. 231, No. 1, pp. 24-25.

⁶ *Ibidem*; L. Chih-Cheng, L. Yen Hung, W. Cheng-Yi et al., *Asymptomatic carrier state, acute respiratory disease, and pneumonia due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): Facts and myths.*, “Journal of Microbiology, Immunology and Infection 2020, Vol. 53, No. 3, pp. 404-412.

⁷ M. Ingot, *COVID-19 – opracowanie zgodne ze stanem wiedzy na 26.03.2020 r.*, <[https://www.umed.wroc.pl/sites/default/files/files/aktualnosci/2020/03/COVID_19_1_0_p_0prawiony_26_03_2020__wersja_po_formatowaniu_\(2\).pdf](https://www.umed.wroc.pl/sites/default/files/files/aktualnosci/2020/03/COVID_19_1_0_p_0prawiony_26_03_2020__wersja_po_formatowaniu_(2).pdf)> (20.12.2022).

⁸ Z. Drulis Kawa, *op. cit.*

⁹ L. Chih-Cheng, L. Yen Hung, W. Cheng-Yi et al., *op. cit.*

¹⁰ *COVID-19: Informacje kliniczne i wytyczne dotyczące leczenia. Międzynarodowa federacja farmaceutyczna*, <<https://www.nia.org.pl/wp-content/uploads/2020/04/FIP-Przewodnik-COVID-19-PL-002.pdf>> (20.11.2022); *WHO Director-General's opening remarks at the media briefing on COVID-19 – 11 March 2020*, <<https://www.who.int/>

COVID-19 is deemed to be a great unknown to both the medical community and the general public. It is also believed that due to its rapid spread, the virus is considered to be an epidemiological threat. Many COVID cases manifest by very severe course of the illness, leading to numerous complications and often death. SARS-CoV-2 is a pathogen of animal origin, where bats are its main reservoir. While the intermediate host through which the virus is transmitted to humans has not yet been established, it is believed that pangolins play a significant role in the spread of the disease among people¹¹. The adequate level of public knowledge of the disease and routes of its transmission may result in implementing preventative measures leading to reducing the number of cases.

Aim of the study

The research aimed to establish students' level of knowledge about the COVID-19 pandemic and to analyse the results according to the field of study and socio-demographic situation.

The assumed practical goal was to utilise the research results for undertaking activities related to obtaining the best possible level of students' knowledge regarding the COVID-19 pandemic. The obtained data will allow us to determine the area in which the students' awareness was the lowest. Concerning the objective, the following detailed research problems were formulated:

1. What is the level of knowledge of the surveyed students about the COVID-19 pandemic?
2. To what extent do socio-demographic variables influence students' level of knowledge about the COVID-19 pandemic?
3. To what extent does the field of study affect the level of knowledge about the COVID-19 pandemic?

Material and method

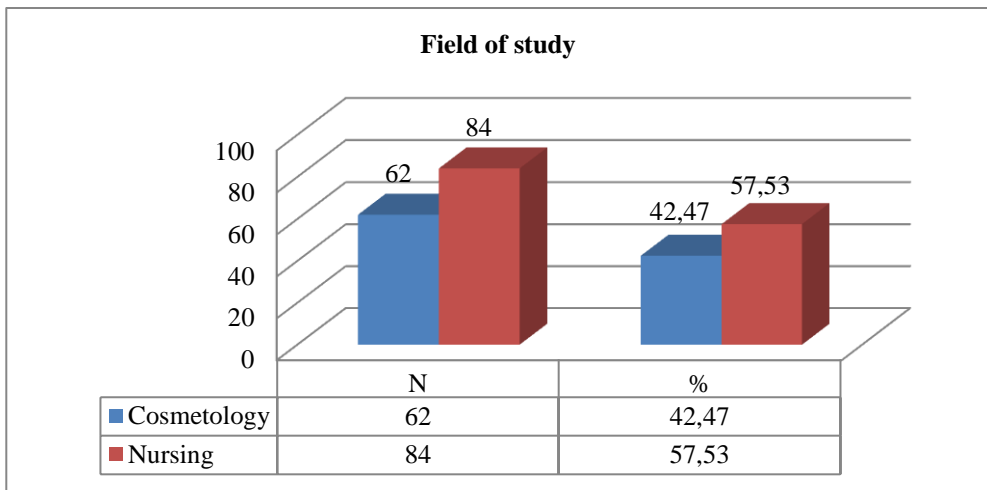
The study included a group of 146 students of Collegium Medicum of Jan Kochanowski University in Kielce. The group of subjects consisted of

director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-COVID-19---11-march-2020> (15.11.2022).

¹¹ A. A. Al-Qahtani, *Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV2): Emergence, history, basic and clinical aspects*, "Saudi Journal of Biological Sciences" 2020, Vol. 27, No. 10, pp. 2531-2538; Z. Pejsak, K. Tarasiuk, B. Tokarz-Deptuła, *Wybrane dane na temat zakażeń koronawirusami, ze szczególnym uwzględnieniem SARS-CoV-2, "Medycyna Weterynaryjna"*; Vol. 76, No. 5, pp. 258-262.

137 women and 9 men. The age range of the surveyed women was 19-45 years, the largest group were people aged 19-21 (n = 97). The surveyed students most frequently declared a good financial situation (n = 87). The decisive criterion for participation in the study was the field of study, which was either nursing or cosmetology. Nursing students prevailed in the study group (57.53%) compared to cosmetology students (42.47%). Detailed data is presented in Fig. 1.

Figure 1. The respondents by field of study.



Source: own research

The study used the diagnostic survey method, and the survey technique was used to collect the research material. The research tool was a self-authorship questionnaire focused on important aspects of the COVID-19 pandemic. The questionnaire consisted of 34 questions concerning the knowledge about the aetiology and characteristics, course and symptoms of the disease, diagnostic methods and treatment methods, methods of preventing transmission of the infection and the spread of the pandemic.

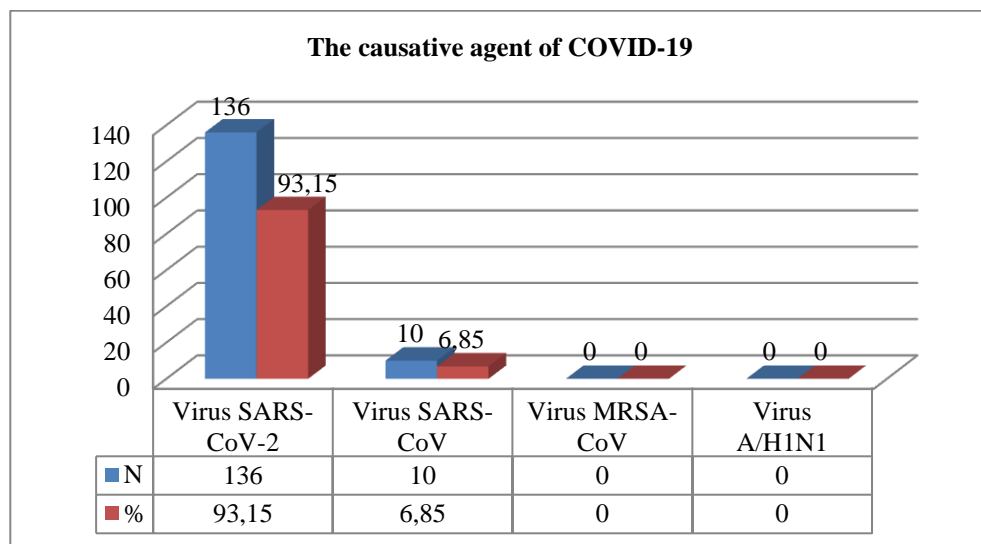
Results

The analysis of the knowledge of the studied students about the COVID-19 pandemic was carried out based on detailed questions regarding the aetiology and characteristics, course and symptoms of the disease, diagnostic methods, treatment methods, methods of preventing transmission of the disease and the spread of the pandemic.

Respondent's knowledge of the causative agent of COVID-19

Most of the respondents (93.15%) gave the correct answer to the question about the factor causing the COVID-19 disease, pointing to the SARS-CoV-2 virus. A small fraction of the group (6.85%) stated that it was the SARS-CoV virus (Fig. 2).

Figure 2. Knowledge of the causative agent of COVID-19 disease.

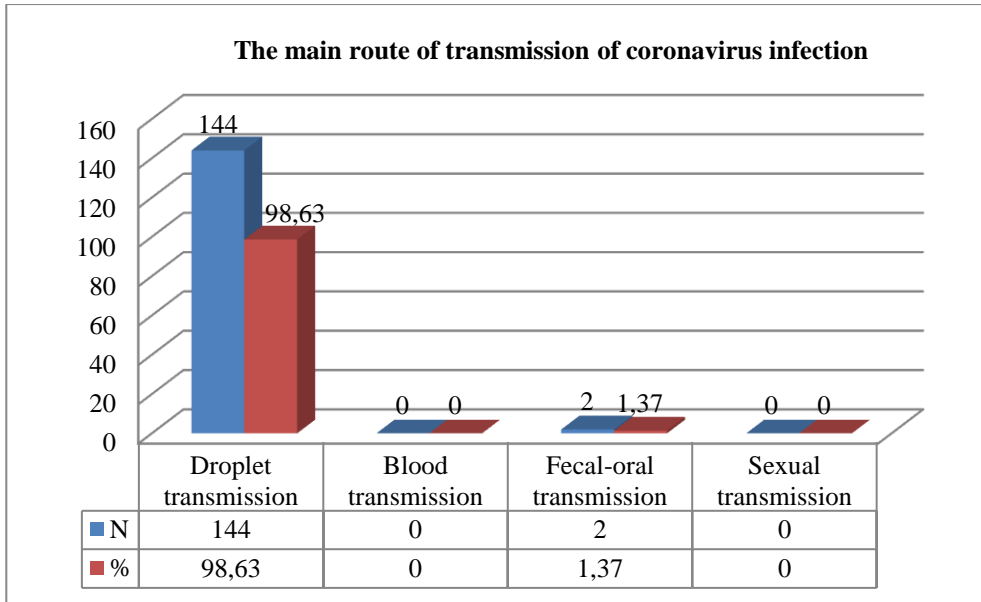


Source: own research

The respondents' knowledge of the main route of transmission of coronavirus infection

The analysis of the responses to the transmission route of the virus revealed that the majority indicated the droplet route (98.63%). Only a small percentage, 1.61% of the respondents identified the faecal-oral route (Fig. 3).

Figure 3. Knowledge about the main transmission route of coronavirus infection.

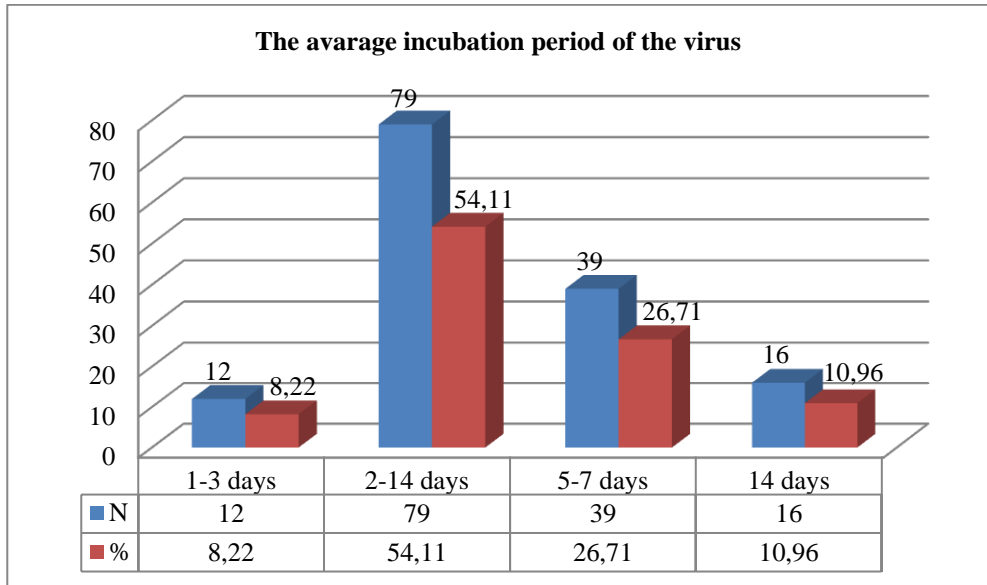


Source: own research.

Knowledge of respondents about the average incubation period of the virus

In the following question, respondents were asked to indicate the average incubation period of the virus. Only 26.71% of the students were aware that the correct incubation time for the virus was 5-7 days, and over half of them (54.11%) considered it to be 2-14 days. Others indicated the answer '14 days' or '1-3 days' (10.96% vs 8.22%). Detailed data is presented in Fig. 4.

Figure 4. Knowledge about the average incubation period of the virus.

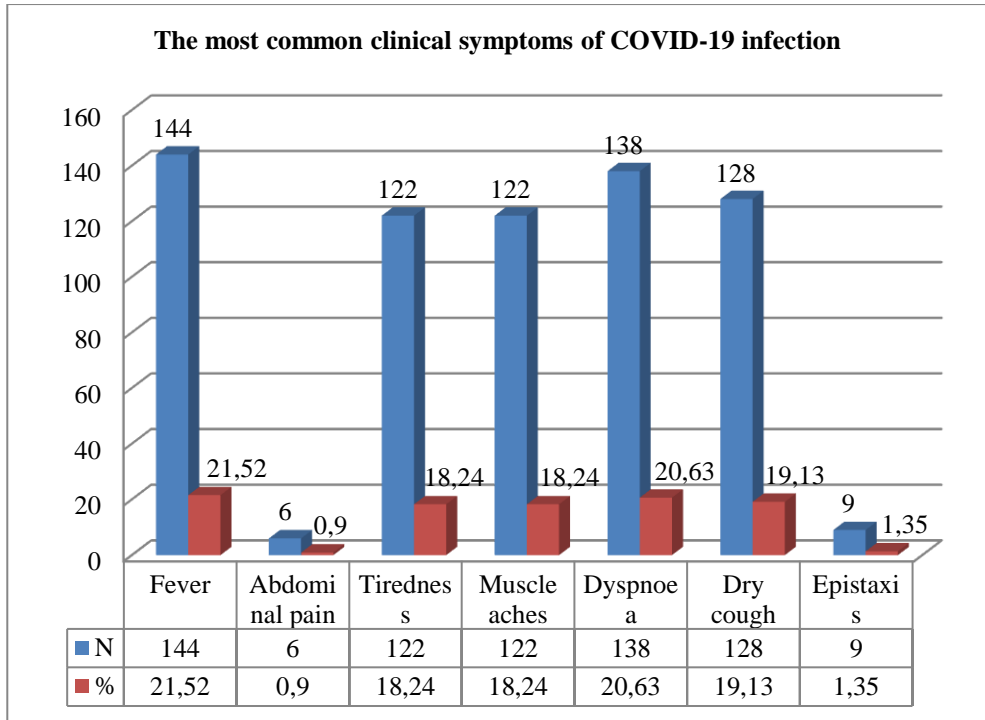


Source: own research.

Respondent's knowledge of the main clinical symptoms of COVID-19

In the next question, they were asked to indicate the basic symptoms of the disease, giving the possibility of multiple-choice answers. According to the respondents, the most frequent symptoms were fever ($n = 144$) and dyspnoea ($n = 138$). Abdominal pain was the least frequently indicated symptom by the respondents ($n = 6$). A detailed distribution of responses is presented in Fig. 5.

Figure 5. Knowledge about the most common clinical symptoms of COVID-19.

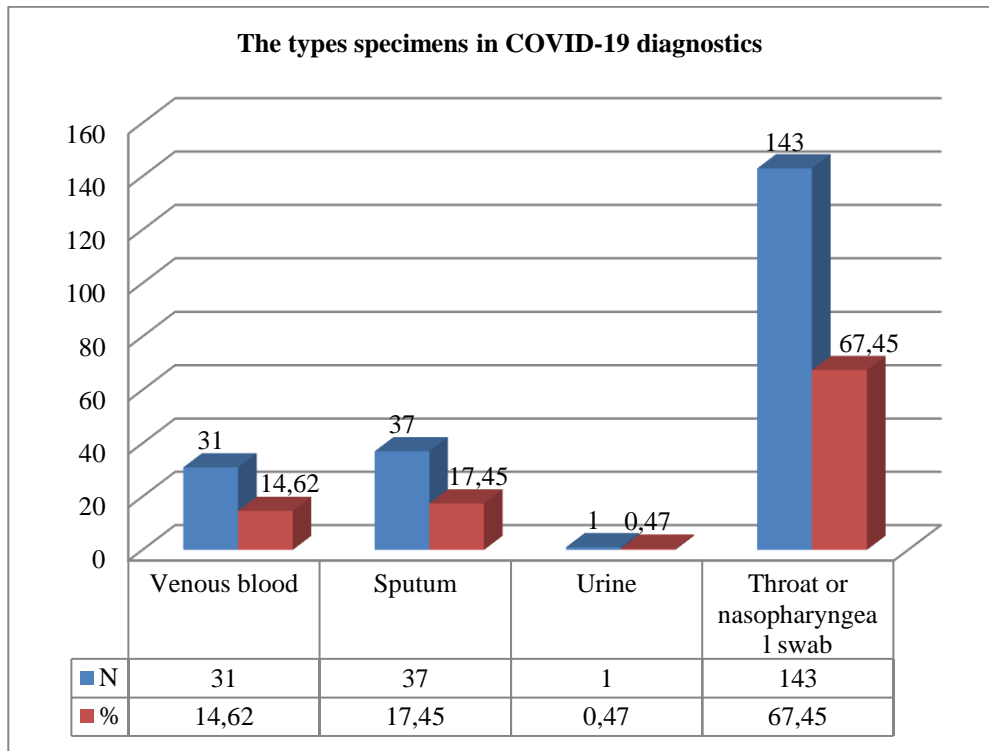


Source: own research.

Knowledge of the respondents about the type of specimens used in COVID-19 diagnostics

The respondents demonstrated knowledge about the specimens used in COVID-19 diagnostics, the most frequently chosen response was a throat or nasopharyngeal swab, which constituted 67.47% of all responses, and the least frequently a urine test (0.47%). Detailed data is presented in Fig. 6.

Figure 6. Knowledge about the types of specimens in COVID-19 diagnostic.

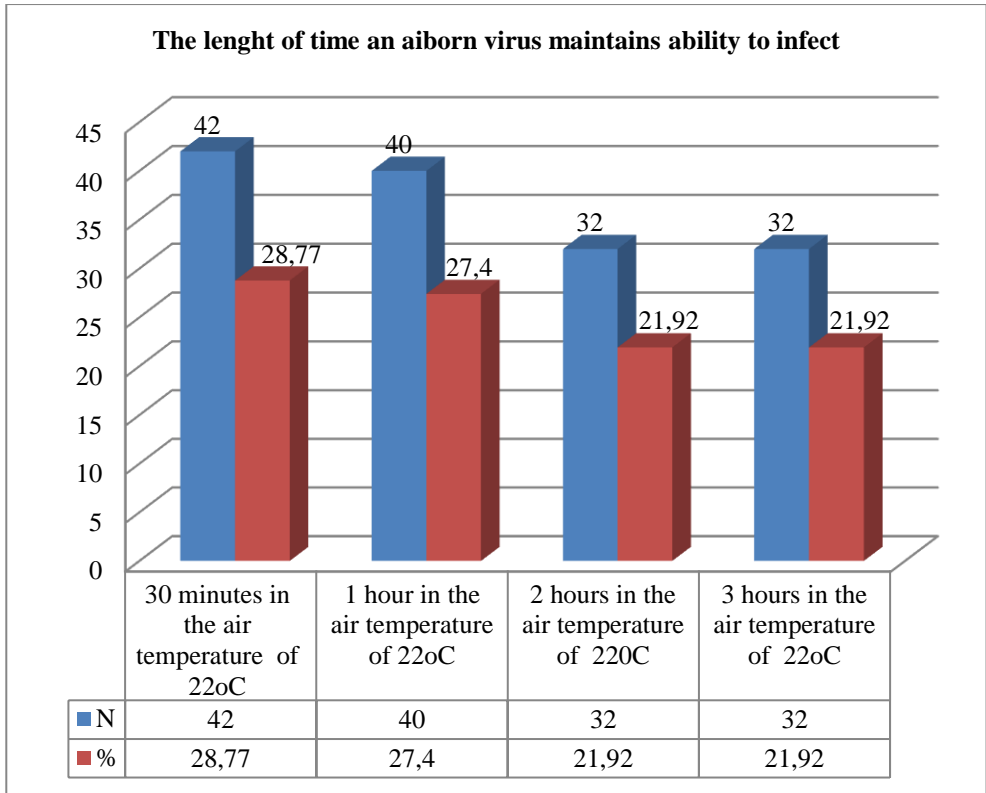


Source: own research.

The respondent's knowledge of the length of time an airborne virus maintains the ability to infect

Respondents were asked to indicate the length of time when a virus sustained in the air at 22°C maintains its ability to infect. Only 21.92% of students pointed at the correct answer of 3 hours. A significant group of respondents believed that this time was shorter and indicated 30 minutes (28.77%) or 1 hour. (27.40%). Other variants of the answer are presented in Fig. 7.

Figure 7. Information on the length of time an airborne virus maintains the ability to infect.



Source: own research.

Knowledge of the procedures used to reduce the risk of developing COVID-19

In the following phase, the knowledge of the principles of prophylaxis decreasing the risk of infection was analysed. Students most frequently indicated that avoiding close contact and avoiding being in the same room with those presenting symptoms of infection (98.63%) is the primary principle to minimize the risk of developing COVID-19. The smallest number of respondents (5.48%) recognized the legitimacy of limiting toilet use as a method of preventing infection (Tab. 1).

Table 1. Knowledge of the procedures used in reducing the risk of developing COVID-19.

What rules should be followed to minimize the risk of developing COVID-19?	N	%
Limiting use of electronic devices (mainly smartphones) in public transport	83	56,85
Restricting use of toilet to a minimum	8	5,48
Not touching water taps directly (closing a water tap off with a paper towel or a tissue) after washing your hands in a public toilet	119	81,51
Cleaning surfaces of smartphones using detergents or alcohol	125	85,62
Daily change of bed linen and towels and washing them in an antiviral agent	0	0,00
Avoiding close contact and avoiding being in the same room with those presenting symptoms of infection	144	98,63

Source: own research.

Knowledge of the respondents about the most effective methods protecting against the inspiration of the virus

The analysis of the responses showed that the students were aware of the types of equipment protecting against infection, against inhalation of airborne particles that may contain coronavirus, indicating a mask with a filter (80.82%). The smallest number of people indicated reusable masks made of double-layer cotton (2.05%), and none of the respondents indicated helmets (Tab. 2).

Table 2. Knowledge of precautionary measures against inhalation of airborne fine particles that may contain virus.

What is the best protection against breathing in fine airborne particles that may contain the virus?	N	%
Surgical masks	25	17,12
Masks with filters	118	80,82
Helmets	0	0,00
Reusable masks made of double-layer cotton	3	2,05
Total	146	100,00

Source: own research.

Analysis of the relationship between the knowledge of the COVID-19 pandemic selected sociodemographic variables and the field of study

The results of the conducted analyses did not show a statistically significant relationship between age ($p = 0.152$), economic status ($p = 0.0977$), field of study ($p = 0.717$), and knowledge about the causative agent of COVID-19.

Analysis of the relationship between the knowledge of the coronavirus transmission route selected sociodemographic variables and the field of study

There was no significant relationship between age ($p = 0.352$), field of study ($p = 0.997$) and students' knowledge of the transmission route. A significant relationship was demonstrated between the economic status and the knowledge of the main transmission route of coronavirus infection, which is confirmed by the statistical test $\text{Chi}^2 = 25.031$; $df = 9$; ($p = 0.0029$). Students most frequently indicated the droplet path as the main route of coronavirus transmission (98.63%). The respondents declaring a good financial situation more often chose this answer (59.59%) compared to other groups of respondents (Tab. 3).

Table 3. Knowledge about the main transmission route of coronavirus infection with the economic status of the respondents.

The main route of Coronavirus transmission	Economic status								Total	
	Very good		Good		Moderate		Poor			
Answers	N	%	N	%	N	%	N	%	N	%
Droplet	25	17,12	87	59,59	30	20,55	2	1,37	144	98,63
Via blood	0	0,00	0	0,00	0	0,00	0	0,00	0	0,00
Fecal-oral	0	0,00	0	0,00	1	0,68	1	0,68	2	1,37
Sexual contact	0	0,00	0	0,00	0	0,00	0	0,00	0	0,00
Total	25	17,12	87	59,59	31	21,23	3	2,05	146	100,0
Test Chi-X ²	25,031									
df	9									
p	0,0029									

Df – the number of degrees of freedom; p-level of statistical significance

Source: own research.

Analysis of the relationship between awareness of the time an airborne virus maintains the ability to infect with selected sociodemographic variables and the field of study

Interpretation of the test result ($\chi^2 = 22.606$; $df = 9$; $p = 0.007$) confirmed a statistically significant relationship between age and the level of knowledge about the time during which an airborne virus is capable of infecting. The biggest group consisted of the students aged 19-21 who believed that the infectious virus persisted in the air at 22°C for 1 hour (21.23%). Detailed data is attached in the Tab. 4.

Table 4. Knowledge of the length of time of an airborne virus maintains the ability to infect by age.

The length of time of an airborne virus maintains ability to infect at the temperature of 22C	Age of the respondents								Total	
	19-21		22-23		24-26		27-45			
Answers	N	%	N	%	N	%	N	%	N	%
30 minutes	24	16,44	16	10,96	2	1,37	0	0,00	42	28,77
1 hour	31	21,23	7	4,79	1	0,68	1	0,68	40	27,40
2 hours	23	15,75	1	0,68	6	4,11	2	1,37	32	21,92
3 hours	19	13,01	9	6,16	2	1,37	2	1,37	32	21,92
RAZEM	97	66,44	33	22,60	11	7,53	5	3,42	146	100,0
Test Chi - X ²	22,606									
Df	9									
P	0,007									

Df – the number of degrees of freedom; p-level of statistical significance

Source: own research.

The analysis of the test results ($\chi^2 = 32.607$; $df = 9$; $p = 0.00015$) confirms the relationship between the knowledge about the time during which an airborne virus is capable of infecting with the economic status. It has also been recognised that the largest group were people who declared their financial situation as good and believed that the infectious virus persists in the air at 22 °C for 2 hours (18.48%). The detailed results are presented in Tab. 5.

Table 5. Knowledge about the time during which an airborne virus is capable of infecting with the economic status.

The length of time of an airborne virus maintains ability to infect at the temperature of 22C	Economic status								Total	
	Very good		Good		Moderate		Poor			
Answers	N	%	N	%	N	%	N	%	N	%
30 minutes	12	8,22	22	15,07	8	5,48	0	0,00	42	28,77
1 hour	9	6,16	25	17,12	5	3,42	1	0,68	40	27,40
2 hours	2	1,37	27	18,49	2	1,37	1	0,68	32	21,92
3 hours	2	1,37	13	8,90	16	10,96	1	0,68	32	21,92
Total	25	17,12	87	59,59	31	21,23	3	2,05	146	100,00
Test Chi - X ²	32,607									
df	9									
p	0,00015									

Df – the number of degrees of freedom; p-level of statistical significance

Source: own research.

The analysis of the relationship between the knowledge about the time during which an airborne virus maintains its ability to infect and the field of study shows a statistically significant relationship, the test result (ChiX2 = 12.006; df = 3; p = 0.007). The correct answer (3 hours) was given more often by nursing students (13.70%) than cosmetology students (8.22%). Cosmetology students most often decided to answer 2 hours (14.38%), and nursing students for 30 minutes (21.23%). Detailed results are presented in Tab. 6.

Table 6. Knowledge of the period time during which an airborne virus maintains its ability to infect in relation to the field of study.

The length of time an airborne virus maintains the ability to infect at the temperature of 22C	Field of study		Total
	Cosmetology	Nursing	

Answers	N	%	N	%	N	%
30 minutes	11	7,53	31	21,23	42	28,77
1 hour	18	12,33	22	15,07	40	27,40
2 hours	21	14,38	11	7,53	32	21,92
3 hours	12	8,22	20	13,70	32	21,92
Total	62	42,47	84	57,53	146	100,00
Test Chi - X 2	12,006					
df	3					
p	0,007					

Df – the number of degrees of freedom; p-level of statistical significance

Source: own research.

Discussion / Summary

COVID-19 is a serious epidemiological threat since the virus responsible for it can spread very rapidly. Many patients with COVID-19 suffer from severe course of the disease, which is associated with numerous complications and often death. An appropriate level of public knowledge about the disease itself and transmission of the virus may translate into adequate preventive behaviour, which will contribute towards reducing the number of cases. The aim of the study, which was to assess the level of knowledge of students of health sciences about the COVID-19 epidemic, correlates with the above-mentioned issues.

146 students of nursing (57.53%) and cosmetology (42.47%) participated in the research. Looking at the age of participants taking part in the study, the great majority were people aged 19-21 (66.44%), and only 3.42% of people were over 27 years of age. When analysing the economic status of the participants, most of them declared economic status as good (59.59%), and the least often they referred to their economic status as poor (2.05%) As demonstrated by their own research, the surveyed students have a high level of knowledge about the clinical aspects of the COVID-19 pandemic. The respondents correctly answered the questions concerning: the causative agent of COVID-19 (93.15%), the transmission route (98.63%), and methods of protection against inhalation of the virus (80.82%).

Further analysis of the responses relating to the questionnaire reviewing the knowledge about the basic symptoms revealed that the most frequently chosen indicated symptom was a fever. The students were also able to correctly indicate other common symptoms of COVID-19, such as dyspnoea, dry cough, muscle pain and fatigue. Similar results were obtained by Erick T. Baloran in

his research on the level of knowledge about COVID-19, which examined 530 students and pupils in the Philippines. According to his research, 97.55% of the respondents claimed that the main symptom of the disease was a fever¹².

When collating obtained data with the study by Marwa S. Hamza et al. who assessed the level of knowledge of pharmacy students in Egypt, it was established that the majority showed a good level of knowledge about COVID-19 (72.5%). In his study respondents indicated the most correct answers in the question relating to the symptoms of COVID-19¹³.

The results of the own research confirmed that the students have proficient knowledge of the basic transmission route of the coronavirus, almost all of them considered it to be a droplet route (98.63%). A slightly lower result was demonstrated by Baloran's study, which shows that 73.58% of respondents knew how the coronavirus spreads and how it transmits¹⁴. Significantly lower results were found in studies by Akshaya Srikanth Bhagavathul et al., conducted on healthcare workers, which revealed that only 61% of respondents were able to indicate the correct transmission route – 61%¹⁵.

The analysis of the respondents' knowledge about the average incubation period of the virus showed that just over a quarter of the respondents (26.71%) indicated the correct duration of 5-7 days, and more than a half of them (54.11%) considered it to be 2-14 days. Others indicated incorrect answers, which is a disturbing phenomenon taking into consideration the specificity of the field of study.

The respondents also showed a good level of knowledge regarding the diagnosis of the disease as 67.47% of them indicated a throat or nasopharyngeal swab as the basic diagnostic specimen confirming diagnosis of COVID-19. Conducted research demonstrated insufficient levels of respondents' knowledge regarding the time in which an airborne virus maintains the ability to infect, only 21.92% of students indicated it correctly as a period of 3 hours. Respondents indicated social distancing and avoiding exposure to people demonstrating symptoms of infection, especially being in the same room as the most effective method to minimize the risk of coronavirus transmission (98.63%), as well as washing and disinfecting hands and surfaces. Students are aware of the means of individual protection against inhalation of airborne

¹² E. T. Baloran. *Knowledge, Attitudes, Anxiety, and Coping Strategies of Students during COVID-19 Pandemic*, "Journal of Loss and Trauma" 2020, Vol. 25, No. 8, pp. 635-642.

¹³ M. S. Hamza, O. A. Badary, M. M. Elmazar, *Cross-Sectional Study on Awareness and Knowledge of COVID-19 Among Senior Pharmacy Students*, "Journal of Community Health" 2021, Vol. 46, No. 1, pp. 139-146.

¹⁴ E. T. Baloran, *op. cit.*

¹⁵ A. S. Bhagavathula, W. A. Aldhaleei, J. Rahmani et al., *Knowledge and Perceptions of COVID-19 Among Health Care Workers: Cross-Sectional Study*, "JMIR Public Health and Surveillance", 2020, Vol. 6, No. 2, e19160.

particles that may contain the coronavirus. As concluded in the study they considered a mask with a filter to be the most effective way of protection (80.82%), while reusable masks and helmets were less useful tools in the fight against the pandemic.

In the context of Baloran's results, it was determined that social distancing and covering the mouth and nose with facial masks was considered as a primary preventive measure limiting the spread of the pandemic by 60.00% of Filipino students¹⁶.

In the following stage of the research, while analysing the relationship between sociodemographic variables and students' knowledge it was established that there is no statistical correlation between age ($p = 0.152$), economic status ($p = 0.0977$) and knowledge of the COVID-19 causative factor.

A statistically significant relation was confirmed between the economic status ($p = 0.0029$) and the knowledge of the transmission route. The knowledge about the time during which an airborne virus maintains its ability to infect was statistically significant and correlated with the age ($p = 0.007$) and economic status ($p = 0.00015$) of the respondents.

In the final stage of the research, the relationship between the field of study and knowledge about COVID-19 was analysed. There was a statistically significant relationship between the field of study and the knowledge about the time during which an airborne virus maintains its ability to infect ($p = 0.007$). In the database of available literature, there is little research on the level of knowledge about COVID-19 among students and the public, which may be because it is a new phenomenon and has not been fully studied by the scientific community as yet. The results of the research can contribute to increasing the awareness of students and the whole society and help reduce the spread of the disease.

Conclusions

1. Students have a good level of knowledge about the causes, and symptoms of the disease, diagnostic methods, and the principles of preventing the COVID-19 pandemic.
2. The significant relation between sociodemographic factors, the field of study and the level of knowledge about the COVID-19 pandemic has not been confirmed.
3. The field of study, age and financial status were significantly related to the level of knowledge of the virus's ability to infect.

¹⁶ E. T. Baloran, *op. cit.*

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